

# Discovery Bay CSD Wastewater Facility:

Increased Energy Efficiency, Increased Reliability, and Reduced Costs



An aeration pond at the Discovery Bay Community Services District wastewater treatment facility. Equipment and process improvements will save a projected \$80,000 annually in energy costs, funded by the California Process Optimization Program.

Discovery Bay CSD utilized a ratepayer funded program to replace aging equipment, increase system reliability, and save \$80,000 a year in projected energy costs at their wastewater treatment plant. The upgrades are projected to pay for themselves in less than one year.

## Project Overview

With the help of rebates and free process audits through the California Wastewater Process Optimization Program (CalPOP), the Discovery Bay Community Services District (CSD) Wastewater Treatment Plant executed a two-phase plan to upgrade their facility.

The first phase reduced energy usage and increased reliability by replacing four horizontal aerators in the facultative sludge lagoons with two solar-powered mixers.

The second phase introduced dissolved oxygen (DO) monitoring in the oxidation ditches, tied to an existing SCADA system, to automatically match aeration supplied to plant loading.

## The Opportunity

The Discovery Bay CSD operates two similar wastewater treatment plants. The influent wastewater is evenly distributed between the two adjacent plants and has a combined design maximum daily dry weather flow of 2.1 million gallons per day (MGD). The secondary treatment processes for both plants consists of a one million gallon oxidation ditch followed by secondary clarifiers.

### Phase 1

Sludge from the Secondary process at both plants is pumped to an aerobic digester and then to two facultative sludge lagoons. The two lagoons are 5.75 million gallons each and each lagoon had two 15 HP aerators. The aerators in the facultative lagoons serve to mix and to keep the top layer of water aerobic to reduce odors. These four 15 HP aerators were operated 24 hours per day, seven days a week.

## Improved Technology & Excessive DO Readings Indicate Potential Savings

As a result of poor aeration reliability and the analysis completed under the CalPOP program, the District decided to replace the four existing aerators with two solar-powered mixers, one in each facultative lagoon. The new equipment improves mixing in the lagoons and also has the advantage of reducing the overall energy demand for the facility.



Oxidation ditches at this Discovery Bay CSD facility were retrofitted with sensors and automated controls to reduce energy usage.

### Phase 2

Originally, the facility operated four 30 HP aerators in each oxidation ditch 24 hours per day, seven days a week. Dissolved oxygen (DO) measurements were taken in the oxidation ditches at both plants over a six day period. Based on the excessive DO measurements recorded, significant energy savings were identified by proposing a reduction in aeration.

To capture these savings the District installed an on-line DO analyzer to start and stop rotors as needed to maintain a constant DO level in each oxidation ditch of 1.5 to 2.0 mg/L. Instead of four aerators constantly running in each ditch, the system now operates a minimum of two aerators in each ditch at all times with additional aeration capacity cycling on and off as necessary to allow for proper mixing of the ditches.

## Significant Benefits With Fast Payback Time

The solar-powered mixers installed in Phase 1 are specifically designed to produce mixing in the upper layers of a lagoon without disturbing the anaerobic sludge layer at the bottom of the lagoon. This enhanced mixing and circulation also increases the amount of water in contact with the air and results in increased oxygen transfer to help keep the top layer of the lagoon aerobic. This resulted in odor control as well as improved reduction of BOD, TSS, ammonia and phosphorus.

The predicted electricity savings for the facultative lagoon aerator retrofits are 31 kW and 276,698 kWh/year producing \$48,947 in cost savings.

The primary benefit of installing the dissolved oxygen sensors in Phase 2 is cost savings since it allows unnecessary oxidation ditch aerators to be turned off. In the pre-retrofit situation four aerators were running in each oxidation ditch, compared to the post-retrofit situation where two aerators run continuously, and one aerator cycles to match the varying oxygen demand. The savings from the dissolved oxygen sensors in the oxidation ditches are predicted to be 48 kW and 427,488 kWh/year, generating \$31,682 in cost savings for the District.

### Discovery Bay CSD Wastewater Facility Project Summary

Project Cost	\$ 125,337
Energy Savings	\$ 80,629
CalPOP Rebate	\$ 77,466
Simple Payback	7 months

## California Municipal Wastewater Treatment Facility Process Optimization Program (CalPOP)

- Pays up to 100% of costs for energy-saving projects at wastewater facilities - on average 60% of costs are covered.
- Provides free facility energy efficiency audits with no obligations.
- Improves process stability and efficiency.

Since 2001, CalPOP has helped more than forty wastewater treatment facilities cut energy costs by optimizing processes. For some facilities, 100% of project costs were covered by Program funds. For other projects that required facility co-pay, the payback period was reduced significantly with CalPOP funding. Today, facilities are enjoying substantially reduced costs as a result of improvements recommended by CalPOP.

CalPOP's authorized program implementer, Quantum Energy Services & Technologies, Inc. (QuEST), works hand-in-hand with plant operators to perform free process audits, install new equipment, and provide training.

For more information or to sign up, contact:

Quantum Energy Services & Technologies, Inc. (QuEST)  
(510) 540-7200  
info@quest-world.com

**QUEST**

QUANTUM ENERGY SERVICES & TECHNOLOGIES, INC.